

**WHAT IS CLAIMED IS:**

1. A method for classifying facial image data, the method comprising the steps of:

a) training a classifier device for recognizing one or more facial images and obtaining corresponding learned models the facial images used for training;

b) inputting a vector including data representing a portion of an unknown facial image to be recognized into said classifier;

c) classifying said portion of said unknown facial image according to a classification method;

d) repeating step b) and c) using a different portion of said unknown facial image at each iteration; and,

e) identifying a single class result from said different portions input to said classifier.

2. The method of claim 1, wherein said classifying step c) includes:

at each iteration, comparing a portion of the unknown image against a corresponding portion of the learned model image for each class; and,

obtaining a confidence score for each classified portion.

3. The method of claim 2, wherein said identifying step e) includes applying a rule to said confidence scores to obtain said single class result.

4. The method of claim 2, wherein said confidence score is a probability measure that a current portion of an unknown facial image is identified with a class, said applied rule including obtaining class having majority of class labels determined for each unknown facial image.

5. The method of claim 2, wherein said classifying step c) includes decreasing at each iteration, the portion of the unknown image being tested and, comparing the decreased portion of the unknown image against a corresponding decreased portion of the learned model image for each class.

6. The method of claim 5, wherein said portions are decreased from 100% of the unknown facial image to 50% of the unknown facial image at equal decrements.

7. The method of claim 1, wherein a Radial Basis Function Network is implemented for training and classifying each image portion.

8. The method of claim 7, wherein said training step comprises:

(a) initializing the Radial Basis Function Network, the initializing step comprising the steps of:

fixing the network structure by selecting a number of basis functions  $F$ , where each basis function  $I$  has the output of a Gaussian non-linearity;

determining the basis function means  $\mu_I$ ,  
where  $I = 1, \dots, F$ , using a K-means clustering algorithm;  
determining the basis function variances  $\sigma_I^2$ ;  
and

determining a global proportionality factor  
 $H$ , for the basis function variances by empirical search;

(b) presenting the training, the presenting step  
comprising the steps of:

inputting training patterns  $X(p)$  and their  
class labels  $C(p)$  to the classification method, where the  
pattern index is  $p = 1, \dots, N$ ;

computing the output of the basis function  
nodes  $y_I(p)$ ,  $F$ , resulting from pattern  $X(p)$ ;

computing the  $F \times F$  correlation matrix  $R$  of  
the basis function outputs; and

computing the  $F \times M$  output matrix  $B$ , where  $d_j$   
is the desired output and  $M$  is the number of output classes  
and  $j = 1, \dots, M$ ; and

(c) determining weights, the determining step  
comprising the steps of:

inverting the  $F \times F$  correlation matrix  $R$  to  
get  $R^{-1}$ ; and

solving for the weights in the network.

9. The method of claim 8, wherein the  
classifying step further comprises:

presenting each  $X_{\text{test}}$  portion at each iteration to  
the classification method; and

classifying each  $X_{\text{test}}$  by:

computing the basis function outputs, for all  $F$  basis functions;  
computing output node activations; and  
selecting the output  $z_j$  with the largest value and classifying the  $X_{\text{test}}$  portion as a class  $j$ .

10. The method of claim 1, wherein the classifying step c) comprises outputting a class label identifying a class to which the detected unknown facial image portion corresponds to and a probability value indicating the probability with which the unknown facial image pattern belongs to the class.

11. An apparatus for classifying facial image data comprising:

a classifier device trained for recognizing one or more facial images and generating corresponding learned models associated with the facial images used for training;

means for iteratively inputting a vector each including data representing a portion of an unknown facial image to be recognized into said classifier, a different image portion being input to said classifier at each iteration, said classifier device classifying each said portion of said unknown facial image according to a classification method;

means for identifying a single class result from said different portions input to said classifier.

12. The apparatus of claim 11, wherein said classifier includes:

mechanism for comparing a portion of the unknown image against a corresponding portion of the learned model image for each class, at each iteration; and, obtaining a confidence score for each classified portion.

13. The apparatus of claim 12, wherein said identifying step e) includes means for applying a rule to said confidence scores to obtain said single class result.

14. The apparatus of claim 12, wherein said confidence score is a probability measure that a current portion of an unknown facial image is identified with a class, said applied rule including identifying class having majority of class labels determined for each unknown facial image.

15. The apparatus of claim 12, including mechanism for decreasing each portion of each unknown facial image being tested at each iteration and, comparing the decreased portion of the unknown image against a corresponding decreased portion of the learned model image for each class.

16. The apparatus of claim 15, wherein said portions are decreased from 100% of the unknown facial image to 50% of the unknown facial image at equal decrements.

17. The apparatus of claim 11, wherein a Radial Basis Function Network is implemented for training and classifying each image portion.

18. A program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform method steps for classifying facial image data, the method comprising the steps of:

a) training a classifier device for recognizing one or more facial images and obtaining corresponding learned models the facial images used for training;

b) inputting a vector including data representing a portion of an unknown facial image to be recognized into said classifier;

c) classifying said portion of said unknown facial image according to a classification method;

d) repeating step b) and c) using a different portion of said unknown facial image at each iteration; and,

e) identifying a single class result from said different portions input to said classifier.

19. The program storage device readable by machine as claimed in claim 18, wherein said classifying step c) includes:

at each iteration, comparing a portion of the unknown image against a corresponding portion of the learned model image for each class; and,

obtaining a confidence score for each classified portion.

20. The program storage device readable by machine as claimed in claim 19, wherein said identifying step e) includes applying a rule to said confidence scores to obtain said single class result.